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METEOROLOGICAL OFFICE

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AN ANALYSIS OF ALDERGROVE SURFACE WIND DATA

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INTRODUCTION

The erection of a direct recording (Dines) pressure-tube anemograph at Aldergrove (Co.Antrim) in March, 1927, has provided the only reasonably long term record of wind direction and speed in Northern Ireland, for the anemograph at Armagh Observatory recorded speed only during the period it was operating.

2. Since 1927 the Aldergrove anemograph has been located at three sites, each approximately at 54°39' N., 6°13' W. (Irish Grid Reference: iJ.1480):-

	Site above sea level	Vane above ground	Effective height
1927-37	262 ft.	40 ft.	20ft.
1937-47	268 ft.	60 ft.	42ft.
1948-	216 ft.	65 ft.	55ft.

There was apparently no break in the record during the change in 1937, but, for 17 months (June 1947 to October 1948) no anemograph data were recorded at this station. For the purpose of this analysis the part years 1927, 1947 and 1948 have been ignored and references to "the whole period" mean that the data are based upon the 31 years 1928-46 plus 1949-1960. In a few places a Table is annotated with a footnote giving additional significant information if it refers to a period of record outside this 31 years (and is complete to the end of 1961).

TABLE 1: PERCENTAGE FREQUENCY OF WIND SPEED WITH DIRECTION

This Table is divided into 13 sections, one for each of the 12 months of the year, and one for the year as a whole. In all, 271,054 hours of observation have been considered during the 31-year period, and in computing the percentage frequency the total of 698 hours of defective record (due to one reason or another) has been ignored.

Up to the end of 1956 the direction was tabulated on a 16-point compass, but for the purpose of this analysis the present 12-point system of 30° bands has been used. The conversion has been made by adopting the original tabulated values for "north", "south", "east" and "west" and by sharing the intermediate values for "northeast", "southeast", "southwest" and "northwest" between their adjacent compass points (i.e. the band 020°-040° comprises the original N.N.E. plus ½N.E., the band 050°-070° comprises the original E.N.E. plus ½N.E., and so on). The values thus obtained for the period up to the end of 1956 were then added to the 12-point data tabulated from that date.

Up to 1950 light winds (calm and up to 3 kt.) were tabulated as one unit. In compiling the individual monthly tables, this practice has been adopted for the whole period. For the "YEAR" table, however, a breakdown has been made into the separate categories of "calm", "light and variable (direction indeterminate)" and "speeds 1-3 kt. (with defined directions)". These values have been obtained by analysing the data for the 10 years, 1951-60, and "weighting" the result so that it refers to the whole 31-year period.

3 8078 0002 3385 0

Asterisks in the tables indicate that no value is appropriate (see previous paragraph), dashes indicate that no value has been recorded, whilst the entry of "00+" has been used for all cases where the frequency of occurrence is less than 0.005 per cent. In making the necessary calculations it has not always been possible (due primarily to values of 00+) to make the total percentage 100.00.

The tables provide total frequencies within speed ranges, irrespective of direction, and also within direction irrespective of speed.

The speed ranges adopted are linked to the Beaufort scale of wind force:

FORCE	0	1	2	3	4	5	6	7	8	9	10
Knots	<1	1-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	48-55
m.p.h.	<1	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47-54	55-63

NB: "Gale" is Force 8 or more.

TABLE 2: MEAN SPEED OVER ONE HOUR

This table is divided into three parts:

(a) the average speed over one hour computed from frequency tables for each of the 12 months and for the year,

(b) the highest hourly mean wind speed recorded in the whole period, with the year(s) of its occurrence,

(c) the lowest maximum mean speed over one hour with the year(s) of its occurrence.

TABLE 3: GUSTS

This table is divided into three parts:

(a) the average maximum gust obtained by summing the maximum gust recorded in each of the Januarys, Februarys, ...Decembers in the whole period and dividing by 31 (years),

(b) the highest gust recorded in each of the 12 months with its year(s) of occurrence,

(c) the lowest maximum gust recorded in each of the 12 months with its year(s) of occurrence.

TABLE 4: FREQUENCIES OF MAXIMUM GUSTS BY MONTHS

This table shows the frequency of occurrence of the maximum gusts, within 10-knot ranges, for each of the 12 months of the year, with yearly totals for each of the speed ranges (i.e. 12 months x 31 years = total 372 observations).

TABLE 5: FREQUENCY OF MAXIMUM GUSTS BY DIRECTION

This table shows the percentage frequency of occurrence of maximum gusts, within 10-knot ranges, for each of the twelve 30° direction bands. This table is based upon the maximum gust recorded on a daily basis throughout the whole period (i.e. a total of 11,323 observations has been considered).

TABLE 6: FREQUENCY OF GUSTS OF 34 kt. OR MORE

This table refers to the number of HOURS in which gusts reached or exceeded 34 knots, and is divided into three parts:

(a) the average number of hours per month,

(b) the highest number of hours in a month, with the year(s) of occurrence,

(c) the lowest number of hours in a month, with the year(s) of occurrence.

TABLE 7: FREQUENCY OF GUSTS OF 48 kt. OR MORE

This table is similar to Table 6, but it refers to the number of hours with gusts reaching or exceeding 48 knots.

The third part of this table, (c), does NOT refer to the lowest number of hours with gusts of 48 kt. or more, as, for all months, the entry is "nil"; but instead shows the number of occasions in the 31 years when the entry was "nil". In the "YEAR" column the value shown, and marked /, is the lowest number of hours in any one year, and the actual years of occurrence are given.

TABLE 8: FREQUENCY OF DAYS WITH GALES

This table is based on the 30 years, 1931-1960, and shows the frequency of days with gales within the three decades, separately. During the period that the anemograph was dismantled (1947-48) other means of determining whether or not a gale occurred were utilised.

DEFINITION: A "day of gale" is one during which the mean wind speed reached or exceeded 34 kt. for a period of at least 10 consecutive minutes at the standard height of 33 feet above the ground. (A day with only gusts reaching or exceeding 34 kt. is not reckoned as a day of gale.)

TABLE 9: DAYS OF GUSTS 34 kt. OR MORE WITH DURATION

The frequency of days with gusts 34 kt. or more is analysed for the whole period, the number of hours in the day being analysed also, within 3-hourly periods.

The following number of days' record had to be ignored due to instrument failure:

Jan	Mar	Jun	Sep	Nov	Dec
3	13	2	1	2	5

Also, the maximum number of hours in a day is shown, with the year(s) of occurrence.

TABLE 10: DAYS OF GUSTS 48 kt. OR MORE WITH DURATION

This table is similar to Table 9, but reference to the occurrence of gusts of 48 kt. or more, and the note regarding missing days' observations also applies to this table.

PROBABILITIES OF OCCURRENCE

Shellard ([1]) produced probability figures of the occurrence of mean wind speeds and gust values using the Aldergrove data, reduced tostandard height of 33 ft. above ground, for the period 1926-46 plus 1949-54, and later revised these to take account of data to the end of 1961. For convenient reference, these latest figures are reproduced below.

	Speeds likely to be exceeded only once in the following number of years			
	10	20	50	100
Maximum mean hourly wind speed (KNOTS)	42	44	48	51
Maximum gusts (KNOTS)	72	76	82	85

N.B. In Shellard's paper the speeds are quoted in m.p.h.

ACKNOWLEDGEMENT

I would like to acknowledge the help in extracting basic data, etc. for this paper given by my Assistant, Mr.T.P.Kane.

REFERENCE

([1]) SHELLARD, H.C., "Extreme Wind Speeds over Great Britain and Northern Ireland", Met.Off., Climat. Memo. No.6, 1958, also Met.Mag.,London, 87, 1958, p.257

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TABLE 1 PERCENTAGE FREQUENCY OF WIND SPEED WITH DIRECTION (mean over 60 minutes)

SPEED RANGE Kt.	350-010°	020-040°	050-070°	080-100°	110-130°	140-160°	170-190°	200-220°	230-250°	260-280°	290-310°	320-340°	TOTAL
JANUARY													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	16.66
4- 6	1.03	0.49	0.84	1.17	1.37	1.82	3.32	2.63	1.39	0.99	1.05	1.05	17.15
7-10	0.96	0.45	0.70	1.08	1.95	2.67	5.33	5.02	2.80	1.62	1.32	0.96	24.86
11-16	0.38	0.30	0.56	1.42	1.77	2.62	5.30	5.31	3.69	1.78	1.13	0.72	24.98
17-21	0.07	0.04	0.36	0.46	0.82	1.10	2.42	2.81	1.66	0.79	0.38	0.30	11.21
22-27	0.07	00+	0.13	0.31	0.45	0.60	1.04	0.67	0.48	0.35	0.21	0.13	4.44
28-33	00+	--	0.02	0.01	0.03	0.10	0.08	0.05	0.09	0.08	0.05	0.06	0.57
34-40	--	--	--	--	--	00+	--	0.02	0.07	0.01	00+	--	0.10
41-47	--	--	--	--	--	--	--	--	0.01	--	--	--	0.01
TOTAL	2.51	1.28	2.61	4.45	6.39	8.91	17.49	16.51	10.19	5.62	4.14	3.22	99.98
FEBRUARY													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	17.03
4- 6	1.28	1.00	1.40	1.19	1.58	1.74	2.30	2.26	1.50	1.11	1.14	1.24	17.74
7-10	1.36	1.09	1.34	1.65	1.99	2.11	3.16	4.34	3.47	2.13	1.46	1.43	25.53
11-16	0.88	0.86	1.02	1.90	1.92	2.18	2.94	5.28	4.12	2.20	1.40	1.12	25.82
17-21	0.20	0.23	0.40	0.51	0.71	0.99	1.12	2.38	1.73	0.79	0.46	0.40	9.92
22-27	0.08	0.02	0.11	0.15	0.29	0.33	0.53	0.78	0.59	0.30	0.23	0.11	3.52
28-33	--	0.01	00+	0.03	0.06	0.04	0.05	0.11	0.06	0.03	00+	--	0.39
34-40	--	--	--	--	--	0.01	00+	0.02	--	--	--	--	0.03
41-47	--	--	--	--	--	00+	0.02	--	--	--	--	--	0.02
TOTAL	3.80	3.21	4.27	5.43	6.55	7.40	10.12	15.17	11.47	6.56	4.69	4.30	100.00
MARCH													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	15.65
4- 6	1.01	0.91	1.80	2.22	1.61	1.94	2.37	2.29	1.50	1.02	0.99	0.90	18.56
7-10	1.13	0.94	1.93	3.27	3.70	2.75	2.71	3.78	2.68	1.56	1.20	1.25	26.90
11-16	1.05	0.91	2.21	3.49	4.31	3.57	2.78	3.57	2.55	1.60	1.15	1.12	28.31
17-21	0.19	0.27	0.71	1.30	1.35	1.28	1.04	1.01	0.71	0.35	0.25	0.34	8.80
22-27	00+	0.02	0.15	0.30	0.25	0.34	0.15	0.15	0.17	0.08	0.04	0.04	1.69
28-33	--	--	--	0.02	0.01	0.06	--	--	--	00+	--	00+	0.09
34-40	--	--	--	--	--	--	--	--	--	--	--	--	0.00
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	3.38	3.05	6.80	10.60	11.23	9.94	9.05	10.80	7.61	4.61	3.63	3.65	100.00

TABLE 1 (continued)

SPEED RANGE Kt.	350-010°	020-040°	050-070°	080-100°	110-130°	140-160°	170-190°	200-220°	230-250°	260-280°	290-310°	320-340°	TOTAL
APRIL													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	15.51
4- 6	1.70	1.40	2.23	1.51	1.36	1.28	1.73	1.93	1.70	1.56	1.63	2.03	20.06
7-10	2.10	1.48	2.14	2.25	2.12	2.16	2.15	3.13	3.10	2.30	2.05	3.08	28.06
11-16	1.26	0.90	1.42	1.75	1.95	2.12	2.27	3.32	3.27	2.46	2.33	2.86	25.91
17-21	0.31	0.17	0.24	0.67	0.39	0.71	0.82	1.07	1.15	0.79	0.80	0.90	8.02
22-27	0.04	0.03	0.05	0.26	0.08	0.25	0.20	0.30	0.30	0.22	0.25	0.20	2.18
28-33	--	--	--	--	--	0.02	0.04	0.06	0.07	0.02	0.04	00+	0.25
34-40	--	--	--	--	--	--	00+	--	0.01	--	--	--	0.01
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	5.41	3.98	6.08	6.44	5.90	6.54	7.21	9.81	9.60	7.35	7.10	9.07	100.00
MAY													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	20.38
4- 6	2.38	1.44	3.11	2.59	1.83	1.72	1.52	1.52	1.44	1.46	1.44	2.50	22.95
7-10	2.28	1.71	3.23	2.82	2.81	3.16	2.82	2.43	1.93	1.46	1.53	3.33	29.51
11-16	1.08	0.86	1.87	2.08	2.09	2.81	1.94	2.09	1.74	1.22	1.33	2.43	21.54
17-21	0.26	0.15	0.35	0.52	0.31	0.71	0.38	0.54	0.41	0.36	0.29	0.49	4.77
22-27	0.01	0.02	0.05	0.09	0.01	0.09	0.09	0.10	0.14	0.04	0.03	0.11	0.78
28-33	--	--	00+	0.05	--	--	00+	00+	--	00+	0.01	--	0.06
34-40	--	--	--	--	--	--	--	--	--	--	00+	--	00+
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	6.01	4.18	8.61	8.15	7.05	8.49	6.75	6.68	5.66	4.54	4.63	8.86	99.99
JUNE													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	21.45
4- 6	1.86	1.04	2.49	2.23	1.56	1.87	2.25	2.26	2.28	1.67	1.94	2.61	24.06
7-10	1.82	0.64	1.59	1.92	2.02	1.97	3.31	3.60	3.77	2.92	2.67	4.34	30.57
11-16	0.88	0.23	0.52	0.95	0.82	1.45	2.23	3.26	3.07	2.16	1.81	2.41	19.79
17-21	0.17	0.03	0.13	0.18	0.09	0.23	0.27	0.53	0.67	0.70	0.33	0.17	3.50
22-27	0.04	0.01	0.03	0.02	0.01	--	0.05	0.09	0.19	0.11	0.01	00+	0.56
28-33	--	--	--	--	--	--	--	0.01	0.02	00+	--	--	0.03
34-40	--	--	--	--	--	--	--	0.01	--	0.01	--	--	0.02
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	4.77	1.95	4.76	5.30	4.50	5.52	8.11	9.76	10.00	7.57	6.76	9.53	99.98

TABLE 1 (continued)

SPEED RANGE Kt.	350-010°	020-040°	050-070°	080-100°	110-130°	140-160°	170-190°	200-220°	230-250°	260-280°	290-310°	320-340°	TOTAL
JULY													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	21.24
4- 6	1.62	0.81	1.34	1.11	1.14	1.55	2.66	2.95	3.31	2.71	2.92	2.77	24.89
7-10	1.54	0.56	0.91	1.02	1.29	1.98	3.34	4.24	4.79	3.94	3.49	4.07	31.17
11-16	0.56	0.20	0.52	0.43	0.79	1.56	1.79	3.01	3.23	2.78	2.21	2.33	19.41
17-21	0.04	0.01	0.07	0.04	0.13	0.20	0.20	0.34	0.60	0.56	0.36	0.37	2.92
22-27	--	--	--	00+	00+	0.01	--	0.03	0.13	0.10	0.06	0.02	0.35
28-33	--	--	--	--	--	--	--	--	0.01	--	--	--	0.01
34-40	--	--	--	--	--	--	--	--	--	--	--	--	0.00
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	3.76	1.58	2.84	2.60	3.35	5.30	7.99	10.57	12.07	10.09	9.04	9.56	99.99
AUGUST													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	24.49
4- 6	1.73	0.90	1.48	1.42	1.49	2.15	3.46	3.24	2.96	2.68	2.35	2.51	26.37
7-10	1.17	0.70	1.07	1.21	1.74	2.29	3.36	4.27	4.33	3.16	2.19	3.19	28.68
11-16	0.43	0.20	0.29	0.47	0.91	1.24	2.35	2.80	2.75	2.05	1.77	1.60	16.86
17-21	0.03	0.02	0.01	0.08	0.09	0.21	0.31	0.58	0.61	0.31	0.37	0.25	2.87
22-27	--	--	--	0.03	00+	0.06	0.03	0.11	0.12	0.08	0.07	0.09	0.59
28-33	--	--	--	--	--	00+	0.03	0.02	0.03	0.01	0.02	--	0.11
34-40	--	--	--	--	--	00+	0.02	--	--	--	0.01	--	0.03
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	3.36	1.82	2.85	3.21	4.23	5.95	9.56	11.02	10.80	8.29	6.78	7.64	100.00
SEPTEMBER													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	20.06
4- 6	1.26	1.04	2.04	1.73	1.73	2.26	3.01	2.84	1.86	1.39	1.59	1.95	22.70
7-10	0.91	0.78	1.38	1.36	2.34	3.07	3.81	4.63	3.41	2.38	1.89	2.09	28.05
11-16	0.65	0.35	0.48	0.90	1.13	2.17	3.00	4.10	3.20	2.64	1.69	1.20	21.51
17-21	0.12	00+	0.10	0.48	0.18	0.53	0.68	1.21	0.99	0.87	0.53	0.24	5.93
22-27	0.02	--	0.01	0.10	0.03	0.14	0.22	0.16	0.24	0.28	0.15	0.05	1.40
28-33	--	--	--	0.02	0.01	0.03	0.03	0.04	0.04	0.07	0.03	--	0.27
34-40	--	--	--	--	--	--	--	0.01	0.03	0.04	--	--	0.08
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	2.96	2.17	4.01	4.59	5.42	8.20	10.75	12.99	9.77	7.67	5.88	5.53	100.00

TABLE 1 (continued)

SPEED RANGE Kt.	350-010°	020-040°	050-070°	080-100°	110-130°	140-160°	170-190°	200-220°	230-250°	260-280°	290-310°	320-340°	TOTAL
OCTOBER													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	16.63
4- 6	0.95	0.77	1.60	1.34	1.63	1.66	3.03	2.39	1.75	1.21	1.50	1.41	19.34
7-10	1.01	0.62	1.08	1.41	2.18	2.69	4.49	4.78	3.92	2.61	1.73	1.56	28.08
11-16	0.59	0.25	0.61	0.93	1.90	2.37	4.12	5.75	4.45	2.29	1.51	1.02	25.79
17-21	0.11	0.02	0.09	0.28	0.48	0.51	1.00	1.77	1.63	0.96	0.69	0.42	7.96
22-27	0.03	0.03	0.02	0.01	0.12	0.14	0.16	0.43	0.44	0.19	0.16	0,16	1.89
28-33	00+	--	0.01	--	0.01	0.02	0.06	0.06	0.06	0.06	0.03	0.02	0.33
34-40	00+	--	0.01	--	--	00+	0.03	0.02	0.01	00+	--	00+	0.07
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	2.69	1.69	3.42	3.97	6.32	7.39	12.89	15.20	12.26	7.32	5.62	4.59	99.99
NOVEMBER													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	19.43
4- 6	1.23	1.14	1.18	1.65	1.86	2.03	3.10	2.81	1.67	1.22	1.20	1.25	20.34
7-10	1.12	0.61	0.75	1.33	2.11	2.37	4.65	5.23	3.09	1.99	1.85	1.19	26.29
11-16	0.51	0.34	0.61	1.06	1.57	2.42	4.12	4.95	3.29	1.95	1.21	0.67	22.70
17-21	0.21	0.09	0.17	0.22	0.52	0.88	1.17	1.79	1.33	0.91	0.37	0.13	7.79
22-27	0.04	0.02	0.04	0.14	0.35	0.41	0.56	0.37	0.42	0.33	0.16	0.03	2.87
28-33	--	--	--	0.05	0.08	0.08	0.05	0.04	0.05	0.07	0.02	--	0.44
34-40	--	--	--	--	--	0.04	0.01	--	00+	0.04	0.01	--	0.10
41-47	--	--	--	--	--	00+	0.01	--	00+	--	--	--	0.01
TOTAL	3.11	2.20	2.75	4.45	6.49	8.23	13.67	19.19	9.85	6.51	4.82	3.27	99.97
DECEMBER													
0- 3	*	*	*	*	*	*	*	*	*	*	*	*	15.10
4- 6	0.68	0.58	1.03	1.19	1.07	1.74	3.60	3.24	1.39	0.75	0.92	0.78	16.97
7-10	0.52	0.39	0.95	1.50	1.85	2.59	5.34	5.41	3.23	1.77	1.36	0.76	25.67
11-16	0.32	0.29	0.67	1.07	1.68	2.75	5.69	6.30	3.93	1.87	1.03	0.52	26.12
17-21	0.03	0.06	0.11	0.36	0.81	1.13	2.21	2.87	1.69	0.77	0.37	0.18	10.59
22-27	0.04	0.01	0.04	0.20	0.38	0.44	0.83	1.12	0.78	0.45	0.17	0.06	4.52
28-33	0.01	0.02	00+	0.04	0.05	0.10	0.13	0.15	0.22	0.18	0.09	--	0.99
34-40	--	--	--	--	00+	--	--	0.01	0.03	--	00+	--	0.04
41-47	--	--	--	--	--	--	--	--	--	--	--	--	0.00
TOTAL	1.60	1.35	2.80	4.36	5.84	8.75	17.80	19.10	11.27	5.79	3.94	2.30	100.00
YEAR													
calm	*	*	*	*	*	*	*	*	*	*	*	*	4.25
L&V	*	*	*	*	*	*	*	*	*	*	*	*	4.50
1- 3	1.12	0.66	0.93	0.77	0.54	0.58	0.91	0.95	0.71	0.74	0.89	1.11	9.91
4- 6	1.39	0.96	1.71	1.61	1.52	1.81	2.70	2.54	1.90	1.49	1.56	1.75	20.94
7-10	1.33	0.83	1.42	1.73	2.17	2.49	3.71	4.24	3.38	2.32	1.90	2.28	27.80
11-16	0.71	0.47	0.89	1.37	1.74	2.27	3.21	4.14	3.27	2.08	1.55	1.50	23.20
17-21	0.15	0.09	0.23	0.42	0.49	0.71	0.97	1.41	1.09	0.68	0.43	0.35	7.02
22-27	0.03	0.01	0.05	0.13	0.16	0.23	0.32	0.36	0.33	0.21	0.13	0.08	2.04
28-33	00+	00+	00+	0.02	0.02	0.04	0.04	0.05	0.05	0.04	0.02	0.01	0.29
34-40	00+	--	00+	--	00+	0.01	0.01	0.01	0.01	0.01	00+	00+	0.05
41-47	--	--	--	--	--	00+	00+	--	00+	--	--	--	00+
TOTAL	4.73	3.02	5.23	6.05	6.64	8.14	11.87	13.70	10.74	7.57	6.48	7.08	100.00

NOTE: For the "YEAR" table the frequency of direction for the speed range 1-3 knots was obtained by appropriately weighting the frequency for the 10 years 1951-60, for only from 1951 were the calms, "light and variable" and definite directions analysed separately.

TABLE 2 MEAN SPEED OVER ONE HOUR (knots)

Utilising data for the whole period, the following table sets out (a) the average speed over one hour, (b) the highest mean speed over one hour, with the year of its occurrence, and (c) the lowest maximum mean speed over one hour, with the year of its occurence:

	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
a	10.0	9.7	9.4	9.3	8.0	7.6	7.5	7.1	8.3	9.2	9.0	10.2	9.3
b	43 1954	45 1957	33 1939	37 1960	36 1954	45 1960	28 1960	36 1959	40 1954	39 1953 1959	47 1959	40 1954	47 1959
c	19 1929	15 1942	18 1929	19 1937	16 1940	15 1932 1936	16 1941 1951 1955	14 1939	13 1939	17 1937	15 1945	22 1934 1935 1937	13 1939

TABLE 3 GUSTS (knots)

Utilising data for the whole period, the following table sets out (a) the average maximum gust, (b) the actual maximum gust recorded with the year of its occurrence, and (c) the lowest maximum gust with the year of its occurrence:

	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
a	55	51	44	48	43	41	38	40	45	51	51	53	63
b	69 1954	71 1957	54 1928	65 1943	61 1934	67 1938	49 1932	56 1957	60* 1954*	71 1938	73 1928	64 1940	73* 1928*
c	36 1929	30 1942	26 1959	35 1937	30 1940	30 1932	28 1955	27 1939	29 1959	31 1951	28 1945	39 1933	26 1959

TABLE 4 FREQUENCIES OF MAXIMUM GUSTS BY MONTHS

Utilising the data for the whole period, the following table sets out the frequency of maximum gusts per month in 10-knot speed bands:

Range (kt)	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
20-29	-	-	1	-	-	-	2	1	1	-	1	-	6
30-39	1	4	3	4	8	14	19	16	6	3	4	1	83
40-49	5	10	24	14	20	14	10	11	18	13	9	10	158
50-59	18	10	3	11	2	1	-	3	5	9	13	12	87
60-69	7	6	-	2	1	2	-	-	1	5	1	8	33
70-79	-	1	-	-	-	-	-	-	-	1	3	-	5

* This value was exceeded by a maximum gust of 76 knots in September, 1961.

TABLE 5 PERCENTAGE FREQUENCY OF MAXIMUM GUST BY DIRECTION

Utilising data for the whole period, the following table provides the percentage frequency of occurrence of the daily maximum gust (all months) within 10-knot speed bands and 30° direction bands.

SPEED RANGE kt.	350-010°	020-040°	050-070°	080-100°	110-130°	140-160°	170-190°	200-220°	230-250°	260-280°	290-310°	320-340°	TOTAL
1- 9	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	2.8
10-19	2.0	1.1	2.5	2.3	2.6	2.3	2.6	3.3	2.5	1.7	2.2	2.9	28.0
20-29	2.2	1.0	1.7	2.4	2.8	3.5	4.3	5.4	3.9	3.2	3.0	4.2	37.6
30-39	0.8	0.5	0.7	1.2	1.6	2.2	2.6	3.3	2.5	2.3	2.1	1.8	21.6
40-49	0.2	0.1	0.1	0.5	0.5	0.8	0.9	1.0	1.2	0.9	0.9	0.6	7.7
50-59	00+	00+	00+	00+	0.2	0.2	0.2	0.2	0.4	0.3	0.2	0.1	1.8
60-69	00+	--	--	00+	--	00+	00+	00+	0.1	0.1	0.1	00+	.3
70-79	--	--	--	--	--	00+	00+	00+	00+	--	00+	--	0+
TOTAL	5.4	2.9	5.3	6.6	7.9	9.3	10.9	13.5	10.8	8.7	8.7	9.8	(99.8)

TABLE 6 FREQUENCY OF GUSTS OF 34kt OR OVER

Utilising data for the whole period, the following table provides (a) the average number of HOURS per month in which gust values reached or exceeded 34 knots, (b) the highest number of HOURS in a month, with year(s) of occurrence, and (c) the lowest number of HOURS in a month, with the year(s) of occurrence.

	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
a.	63	48	29	35	16	13	8	12	25	38	44	62	393
b.	123	139	85	125*	54	51	41	77	119	84	84	184	658
	1957	1949	1956	1950	1954	1938	1956	1957	1950	1938	1941	1954	1954
c.	3	0	1	2	0	0	0	0	0	0	0	10	184
	1929	1942	1929	1946	1937	1932	1941	1930	1931	1951	1945	1933	1945
					1940	1936	1944	1937	1939				
					1957	1943	1951	1939	1959				
						1958	1955	1945					
							1958	1946					

* 141 in "part year" 1947

TABLE 7 FREQUENCY OF GUSTS OF 48kt OR OVER

Utilising data for the whole period, the following table provides (a) the average number of HOURS per month in which gusts reached or exceeded 48 knots, (b) the highest number of HOURS in a month, with year(s) of occurrence, and (c) the number of YEARS (out of total 31) when thenumber of hours was "NIL"

	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
a.	6.4	3.2	0.7	0.5	0.4	0.5	00+	0.9	1.8	3.6	4.1	7.3	31.4
b.	22	14	8	14	4*	7	1	17	16	21	19	31	88
	1954	1938	1939	1943	1934	1960	1932	1957	1950	1935	1956	1954	1954
									1954				
c.	1	12	21	12	25	28	30	28	21	11	10	7	5/
													1931
													1933
													1945
													1946

* 5 in May 1961

/ This figure is the lowest number of HOURS in a YEAR, with the years of occurrence.

TABLE 8: FREQUENCY OF DAYS WITH GALE

Utilising data for the 30 years 1931-1960, the following table sets out the frequency of days with gale, within the three separate decades. A "day of gale" is defined in the introduction.

Decade	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
1931-1940	8	3	1	4	0	1	0	0	0	5	2	2	26
1941-1950	3	3	1	1	0	0	0	1	4	2	1	3	19
1951-1960*	16	5	1	2	1	3	0	1	6	4	7	16	62

*To some extent the increased number of gales in the last decade may be due to the improvement in the instrument site in 1948, but other checks suggest that the effect of the change of site would not have resulted in the marked increase shown by the figures. It is, therefore, considered that the increased number of gales in the last decade, compared with the previous two decades is "real". Certainly the 14 days with gale in 1954 and the 12 days in 1958, in themselves unusually high, materially helped to increase the decadal total.

TABLE 9 DAYS OF GUSTS 34 kt. OR MORE WITH DURATION

Utilising data for the whole period, the following table sets out the number of DAYS when gusts of 34 kt. or more occurred, broken down into 3-hour duration bands. At the foot of the table is the maximum number of hours recorded in any one day (midnight to midnight), with the year(s) of occurrence.

Number of hours in the day with gusts 34 kt. or more	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
1-3	133	128	121	98	69	47	50	55	89	111	128	138	1167
4-6	72	53	41	43	28	17	17	15	30	46	54	80	496
7-9	48	39	20	23	9	8	3	6	19	30	33	43	281
10-12	28	25	15	17	7	8	3	5	14	21	21	18	182
13-15	15	10	3	12	5	3	3	1	6	13	8	14	93
16-18	13	8	5	6	0	2	0	3	2	5	4	17	65
19-21	8	1	2	5	0	0	0	2	2	0	6	7	33
22-24	4	6	0	1	0	0	0	0	1	2	2	5	21
TOTAL	321	270	207	205	118	85	76	87	163	228	256	322	2338
Max. number	24	24	20	22	15*	16	14≠	21	24	24	24	24	
Year(s)	1940 1941	1940 1943 1950	1937	1960	1934 1955	1938	1956	1957	1950	1935	1937	1952 1959	

Values outside "whole period" which exceed those in the table:

* 21 hours, 1961 ≠ 18 hours, 1961

TABLE 10: DAYS OF GUSTS 48 kt. OR MORE WITH DURATION

Utilising data for the whole period, the following table sets out the number of days when gusts of 48 kt. or more occurred, broken down into 3-hour duration bands. At the foot of the table is the maximum number of hours recorded in any one day (midnight to midnight), with the year(s) of occurrence.

Number of hours in the day with gusts 48 kt. or more	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	YEAR
1-3	63	37	10	27	6	1	1	4	11	27	35	57	279
4-6	10	2	2	5	1	1	0	0	4	4	8	9	46
7-9	2	2	0	1	0	1	0	0	3	2	2	5	18
10-12	1	1	0	0	0	0	0	2	0	2	0	2	8
13-15	1	0	0	0	0	0	0	0	0	1	0	1	3
16-18	1	0	0	0	0	0	0	0	0	0	1	0	2
19-21	0	0	0	0	0	0	0	0	0	0	0	1	1
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	78	42	12	33	7	3	1	6	18	36	46	75	357
Max. number	16	10	5	9	4	7	1	10	8	15	18	19	
year(s)	1954	1936	1939	1960	1934	1960	1932	1957 1959	1950 1954 1956	1935	1956	1949	